



**UNIVERSITAS PENDIDIKAN INDONESIA**  
**FACULTY OF MATHEMATICS AND NATURAL SCIENCES EDUCATION**  
**DEPARTMENT OF PHYSICS EDUCATION**

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**Bachelor of Physics**

**MODULE HANDBOOK**

Module name:	Thermodynamics	
Module level, if applicable:	Undergraduate	
Code:	FI-341	
Sub-heading, if applicable:	-	
Classes, if applicable:	-	
Semester:	3 <sup>rd</sup>	
Module coordinator:	Lilik Hasanah	
Lecturer(s):	Lilik Hasanah	
Language:	Bahasa Indonesia	
Classification within the curriculum:	Compulsory course	
Type of teaching	Contact hours per week during the semester	Class Size
1. Lecture (conceptual, contextual and problem-solving approaches through expository, discussions and practical methods). 2. Structured activities (assignments based on conceptual, contextual and problem-solving approaches). 3. Self-study (reading literature)	2 hour 30 minutes	45
Workload:	The total workload is 136 hours/8160 minutes (4.8 ECTS) per semester, consisting of 35 hours/2100 minutes lectures (1.24 ECTS), 42 hours/2520 minutes structured activities (1.48 ECTS) and 42 hours/2520 minutes self-study (1.71 ECTS) per week for 14 weeks, 17 hours/1020 minutes for two exams (0.6 ECTS).	
Credit points:	4,8 ECTS	
Pre-requisites course(s):	Basic Physics I and II, Basic Mathematic, Mathematical Physics I and II	

Course Learning Outcomes:	<p>After taking this course the students have ability to:</p> <p>CLO1. Describe thermodynamic coordinates for hydrostatic, dielectric, and paramagnetic systems.</p> <p>CLO2. Analyze mathematics for thermodynamics and its applications.</p> <p>CLO3. Describe temperature and its measurements are based on the zeroth law of thermodynamics.</p> <p>CLO4. Describe the first law of thermodynamics.</p> <p>CLO5. Describe the second law of thermodynamics and its application in various cycles of combustion engines and cooling engines.</p> <p>CLO6. Analyse the Carnot cycle and reversibility.</p> <p>CLO7. Analyse the Entropy.</p> <p>CLO8. Analyse the Thermodynamic potential.</p>															
Content:	<p>Thermodynamic coordinates for hydrostatic, dielectric, and paramagnetic systems; mathematics for thermodynamics and its applications, temperature and its measurements are based on the zeroth law of thermodynamics; working principle of various thermometers based on their thermometric properties; systems and equations of state; quasistatic processes in thermodynamics; external mechanical effort; the first law of thermodynamics for closed systems; Ideal Gases; the second law of thermodynamics and its application in various cycles of combustion engines and cooling engines; Carnot cycle and reversibility, entropy, thermodynamic potential, and the complete formulation of thermodynamics according to Maxwell's formula.</p>															
Study/exam achievements:	<p>The final mark will be weight as follow:</p> <table border="1" data-bbox="616 1216 1442 1626"> <thead> <tr> <th>No</th> <th>CLO</th> <th>Assessment Object</th> <th>Assessment Techniques</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CLO1 - CLO8</td> <td>Subject specific competences: a. Individual assignments b. Exam - Quiz - Mid exam - Final exam</td> <td>Written  Written test Written test Written test</td> <td>10 %  30 % 30 % 30 %</td> </tr> <tr> <td colspan="4">Total</td> <td>100%</td> </tr> </tbody> </table>	No	CLO	Assessment Object	Assessment Techniques	Weight	1	CLO1 - CLO8	Subject specific competences: a. Individual assignments b. Exam - Quiz - Mid exam - Final exam	Written  Written test Written test Written test	10 %  30 % 30 % 30 %	Total				100%
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Forms of media:	Board, LCD Projector, Laptop/Computer, LMS															
Literature:	<ol style="list-style-type: none"> <li>1. Yunus A.Cengel and Michael Boles.1994. <b><i>Thermodynamics An Engineering Approach</i></b>, Second Edition, McGraw-Hill,Inc.</li> <li>2. Mark W.Zemansky and Richard H.Dittman. 1982. <b><i>Heat and Thermodynamics</i></b>, Sixth Edition, McGraw-Hill,Inc. Diterjemahkan kedalam Bahasa Indonesia oleh The Houw Liong.1986. <b><i>Kalor dan termodinamika</i></b>, terbitan keenam, Bandung, Institut Teknologi Bandung (ITB).</li> <li>3. Saeful Karim. 2001. <b><i>Matematika untuk Termodinamika</i></b> (Diktat), Jurusan Pendidikan Fisika FPMIPA UPI.</li> <li>4. Paul A Tipler.1991. <b><i>Physics for Scientits and Engineers</i></b>, Third Edition, Worth Publisher,inc.</li> </ol>															



